Appendix C

Noise Report and Figures

DRAFT
SR 262 EA
Traffic Noise Analysis Report

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1.0 OVERVIEW

A noise analysis was completed in support of the Environmental Impact Statement (EIS) for the SR 262 project in southeastern Utah. The purpose of the project is to address safety issues along an eight mile two-lane section of SR 162 between the towns of Montezuma Creek and Aneth. The project also focused on the realignment of an off-set, four-way intersection in Montezuma Creek at SR 162 and SR 262. Currently this intersection operates as two separate t-intersections and the proposed alternatives would realign SR 162 to create one single intersection with SR 262. This report was prepared to examine traffic noise from existing conditions, three build alternatives, and the no build alternative for the SR 262 project.

Noise abatement will be considered for Type I projects where noise impacts are identified. A Type I project is one that includes construction of a transportation facility on a new location, increases the number of through traffic lanes or substantially alters the horizontal or vertical alignment of an existing transportation facility. Projects that do not meet the Type I project criteria are not required to undergo noise analysis. Since the project does not meet the Type I criteria for the eight mile two-lane section of SR 162 between the towns of Montezuma Creek and Aneth, a noise analysis was not performed that section. A noise analysis was completed for the realignment alternatives of the SR 162/SR 262 intersection since the horizontal alignment of SR 162 substantially changes through the intersection. The realignment of this intersection is the focus of this report.

Existing noise levels were characterized and future 2030 noise levels were modeled to determine possible traffic noise impacts associated with the alternatives. In addition, potential noise abatement strategies were considered for mitigating roadway noise impacts. This process was completed according to State (Utah Department of Transportation (UDOT) 08A2-1 contained in Appendix A) and Federal (Federal Regulation 23 CFR 772) noise policies and regulations. Noise impacts were calculated using the Federal Highway Administration (FHWA) Traffic Noise Model (TNM) Version 2.5 computer program for receiver locations along the affected route of each alternative.

The No Build alternative included the existing roadway network and projected 2030 traffic volumes.

There are three build intersection alternatives. Alternative A proposes a centered alignment for SR 162 with the single intersection located between the t-intersections on SR 262. Alternative B proposes a northern shift of SR 162 with the single intersection located at the northern t-intersection with SR 262. Alternative C proposes a southern shift of SR 162 with the single intersection located at the southern t-intersection with SR 262. Figure 1, in Appendix B, shows the proposed alternative alignments for the SR 162/SR 262 intersection.

2.0 TRAFFIC NOISE MODELING METHODOLOGY

All sound level measurements and estimates in this document are reported as Leq(h) in units of decibel (dB) and are A-weighted. The Leq describes the receiver's average noise exposure from all events over a given period of time. Leq(h) is the hourly value of Leq. The "A" indicates that the sound has been filtered to reduce the strength of very low and very high frequency sounds, much as the human ear would hear. On the average, each A-weighted sound level increase of 10 dB corresponds to an approximate doubling of subjective loudness. Table 1 summarizes the audible differences perceived by most people associated with changes in decibel levels (UDOT, 2004).

Table 1. Decibel Increase vs. Audible Difference

Decibel Increase	Audible Difference
1 dBA	No perceptible change
3 dBA	Barely perceptible change
5 dBA	Readily perceptible change
10 dBA	Perceived as twice as loud

Source: UDOT, 2004

2.1 Noise Abatement Guidelines

UDOT considers noise impacts based on FHWA Noise Abatement Criteria (NAC) (23CFR772). FHWA requires all states to define at what value a predicted noise level approaches the NAC defined in 23 CFR 772, and, thus, results in a noise impact (FHWA, 1995). UDOT has defined "approach" as 2 dBA less than the FHWA NAC for use in identifying traffic noise impacts in traffic noise analyses. The UDOT NAC is shown in Table 2.

Two types of noise levels occurring at sensitive land use areas are considered impacts under the UDOT criteria (UDOT, 2006):

(1) The design level is greater than or equal to the UDOT NAC shown in Table 2 for the respective activity category.

(2) The design level is greater than or equal to an increase of 10 dBA over the existing noise level, regardless of the existing noise value.

Therefore, if a project predicts a noise level equal to the values shown in the following table, or a noise level greater than 10 dBA over existing levels, some sort of abatement must be considered for the project in the appropriate locations. Some locations, however, may not be feasible or reasonable for abatement.

UDOT considers a severe traffic noise impact to be an increase of 30 dBA or more over existing residential noise levels, or a predicted absolute noise level of 80 dBA or more (UDOT 2006).

Table 2. UDOT Noise Abatement Criteria

Activity Category	Leq(h), dBA*	Description of Activity Category
A	55 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	65 (exterior)	Picnic areas, recreational areas, playgrounds, active sport areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	70 (exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	None	Undeveloped lands.
E	50 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: UDOT, 2006

*Hourly A-weighted sound level, reflecting a 2dBA approach value below 23CFR772

The majority of the project area is rural in nature and includes residential and commercial land uses.

2.2 Existing Noise Assessment

A total of six noise measurements were taken along the eight mile section of SR 162 between Montezuma Creek and Aneth as part of the SR 262 EA analysis effort. The measurements were recorded on mild, calm weekdays using a Quest Technologies 2900 integrating and logging sound level meter. The meter was calibrated using a Quest Technologies QC-10 sound calibrator prior to taking measurements. Relevant data, such as traffic volumes, vehicle types, and traffic speeds were collected for verification of FHWA's Traffic Noise Model (TNM). No significant or altering noises were observed during the measurements.

Only one of the six field readings was in the vicinity of the intersection realignment at SR 162 and SR 262 and was used for model verification.

A comparative analysis of the sound level meter reading and modeled receptor noise level is shown in Table 3. The difference between the existing reading and verified model noise level is within 3dBA and considered acceptable.

Table 3. Meter Readings and Modeled Noise Levels

Location	Existing Leq(h), dBA*	Verified Existing Leq(h), dBA	Difference, dBA
East of SR 262 Across from the Elementary School	60.3	59.9	0.4

The model configuration was verified using actual noise measurements and calculated TNM modeled values. This verified model was used for existing conditions and for creating the alternative models for the SR 262 EA project.

2.3 2030 Noise Assessment

The noise model was created and modified as necessary to reflect the 2030 intersection alternatives. A total of 13 receivers were placed at various locations and were set at a height of 5 feet above ground. These locations were used to establish the expected noise levels at the receivers. At homes, receivers were generally placed in common use areas such as backyards, porches and patios. Figure 2, in Appendix B, shows the location of the receivers.

For most of the study area the topography is fairly consistent. The overall terrain of SR 162, through the intersection study area, ranges in elevation from 4,447 feet to 4,458 feet. The overall terrain of SR 262, through the intersection study area, ranges in elevation from 4,437 feet south of the intersection to 4,467 feet north of the intersection. The natural topography, receptor locations, roadway alignments, and slopes were included in the model setup and verification. There are no existing noise barrier walls in the study area.

Table 4 illustrates the number of lanes and two-way peak hour traffic volumes assumed for SR 162 and SR 262 in the models.

Table 4. Roadway Laneage and Traffic Volumes

Roadway	Existing # Lanes	No Build # Lanes	Build # Lanes	Existing Volume	No Build Volume	Build Alternatives Volume
SR 262 West/East	2/2	2/2	2/2	124/222	264/473	264/473
SR 162 South/North	2/2	2/2	2/2	46/38	98/81	98/81

Table 5 illustrates the vehicle mix and speeds that were assumed for the roadways in the models.

Table 5. Vehicle Mix

Vehicle Type	Percentage of Vehicle Mix	Speed SR 162/SR 262
Cars	82%	40 mph/55 mph
Medium Heavy Vehicles	4%	40 mph/55 mph
Large Heavy Vehicles	14%	40 mph/55 mph

3.0 NOISE IMPACTS

The intersection alternatives were modeled to determine predicted noise levels and to evaluate if mitigation should be considered. Noise generated by construction activities of realigning the SR 262/SR 162 intersection is also considered.

3.1 Alternative Analysis

The future 2030 noise model runs for the intersection alternatives were based on the existing model. For the intersection alternatives, the existing model was modified based on roadway improvements and future traffic data. The No Build alternative used the existing roadway configuration and future traffic data. The traffic volumes for the No Build alternative are the same as the intersection build alternatives.

Receivers were placed along the corridor and typically represent areas where residents will be using their homes, also referred to in this document as receptor sites. The receivers along the corridor in these models were primarily placed outside residential areas such as backyards and

patios where residents may be exposed to traffic noise. For this analysis, each receiver represents one receptor site. Receivers are modeled at a height of five feet above the ground level elevation to approximate the height of the average human ear.

Table 6 contains the traffic noise levels resulting from the TNM for Existing conditions, the No Build alternative and the intersection alternatives A, B, and C. Receiver locations and the 65 dBA and 70 dBA noise contours are shown on Figures 3 through 7, in Appendix B, for each of the alternatives. The noise contours shown on the figures are approximated and should be used for estimating purposes only. If a more exact reading is desired for a particular location a new model should be completed with a receiver placed at the specific location.

Indirect noise impacts may include increased noise levels associated with increased residential and commercial development resulting from any of the Build Alternatives. These impacts are not quantifiable but can reasonably be expected to occur.

Table 6. Receiver Attributes and Modeled Noise Levels

		Noise Levels – Leq (dBA) per Alternative					
		State Criterion	**Existing**	**No Build Alternative**	**Alternative A**	**Alternative B**	**Alternative C**
R1	Aquatic Center	70	57.5	60.9	60.8	60.9	60.9
R2	Residence	65	47.0	50.4	52.5	50.3	50.7
R3	Residence	65	49.4	52.9	52.9	52.1	53.7
R4	School	65	53.2	56.6	55.5	52.7	56.5
R5	Residence	65	58.1	61.4	61.3	60.6	61.3
R6	Business	70	58.1	61.4	61.3	61.4	61.4
R7	Business	70	53.3	56.6	56.6	56.7	56.6
R8	Church	65	57.1	60.3	60.4	60.3	60.3
R9	Residence	65	56.1	59.4	59.4	59.5	59.4
R10	Residence	65	54.1	57.4	57.4	58.1	57.3
R11	Church	65	57.9	61.2	61.3	63.4	61.1
R12	Residence	65	48.5	51.8	51.5	54.0	51.3
R13	Business	70	55.1	58.5	58.3	57.9	58.9

Table 6 indicates that none of the receptor locations either approaches or exceeds the noise abatement criteria under the existing or future conditions or is subjected to a substantial increase in noise levels. No traffic noise impacts were identified under the future conditions for any of the proposed intersection alternatives and further consideration of mitigation is not required.

3.2 Construction Impacts

Any impact occurring to local residents as a result of construction would be temporary and minimized by compliance with UDOT standard procedures for road construction (UDOT Specification #01355 Part 1.7).

4.0 CONCLUSIONS

No traffic noise impacts were identified for the noise sensitive receivers that were identified and analyzed for noise impacts as part of the SR 262 EIS. As a result, further consideration of mitigation is not required.

REFERENCES

Federal Highway Administration (FHWA), 1995. Highway Traffic Noise Analysis and Abatement Policy and Guidance, U.S. Department of Transportation, June 1995.

Utah Department of Transportation (UDOT), 2006. Noise Abatement, UDOT 08A2-1, Effective November 7, 1987, Revised: June 16, 2006.

APPENDIX A

UDOT Noise Abatement Policy

Noise Abatement UDOT 08A2-1

Effective: November 6, 1987 Revised: June 16, 2006

Purpose

To establish the policy and procedure for conducting traffic noise studies, implementing noise abatement measures and coordinating with local municipalities and the public to ensure that all feasible and reasonable mitigation measures are incorporated into projects to minimize noise impacts and protect the public health and welfare.

Policy

The Utah Department of Transportation recognizes a commitment to minimize noise impacts generated by highway traffic that may adversely impact human activity and the quality of life of residents located in the vicinity of heavily traveled roads. UDOT will install noise mitigation measures according to the guidelines and requirements set forth in the Procedure implementing this policy. The highway traffic noise prediction requirements, noise analysis, and noise abatement criteria in this regulation are consistent with *Federal Regulation 23 CFR 772 - Procedures for Abatement of Highway Traffic Noise and Construction Noise* and *Utah Code 72-6-111 & 112.*

Background

A. Applicability

1. Type I Project - Noise abatement will be considered for Type I projects that are on Interstate or Limited Access Highways where noise impacts are identified. A Type I project is one that includes construction of a transportation facility on a new location, increases the number of through traffic lanes or substantially alters the horizontal or vertical alignment of an existing transportation facility.
   Noise impact analyses will include lands within Land Use Activity Categories A, B, and C only when development exists or "planned, designed, and programmed." (See Table 1) UDOT will consider a development as being "planned, designed, and programmed" when a formal building permit has been issued to the developer prior to the date the final environmental decision document is approved. These same criteria will be used when determining if the owner/resident of these same lands will be allowed to cast a ballot-for or against noise abatement if the analyses determines it is reasonable and feasible (See Section C.5, Public Involvement). Noise impact analysis will not be considered for undeveloped lands.

Type II Project - The Utah Department of Transportation does not provide a noise retrofit (Type II) program.

B. Analysis of Traffic Noise Impacts and Abatement Measures

1. The Department will evaluate expected traffic noise impacts associated with Type I projects and abatement measures to mitigate these impacts.

2. The traffic noise analysis will include the following:

   a. Identification of existing activities, developed lands, and undeveloped lands for which development is planned, designed and programmed. (See definition under Section A.1)

   b. Determination of existing and future build noise levels.

   c. Determination of traffic noise impacts.

   d. Examination and evaluation of alternative noise abatement measures for reducing or eliminating noise impacts.

3. UDOT considers traffic noise impacts to occur when either of the following conditions occur at a sensitive land use area:

   a. The design noise level is greater than or equal to the UDOT Noise Abatement Criterion (NAC) in Table 1 for each corresponding land use category.

Table 1
UDOT Noise Abatement Criteria (NAC)
Based on FHWA Noise Abatement Criteria, 23CFR772

Activity Category	Leq(h), dBA*	Description of Activity Category
A	55 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	65 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, hospitals and cemeteries.
C	70 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	50 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

- Hourly A-Weighted Sound Level in Decibels, Reflecting a 2 dBA "Approach" Value Below 23CFR772 Values

b. The design noise level is greater than or equal to an increase of 10 dBA over the existing noise level. This impact criterion takes effect regardless of the existing noise levels. Existing noise levels are defined as the noise levels (present conditions) at a receiver prior to the addition of the travel lanes or new construction on the adjacent transportation facility.

A 10 dBA increase is perceived by most people as a doubling of noise loudness. (See Table 2)

Table 2: SOUND LEVEL CHANGE vs. LOUDNESS

Sound Level Change	Relative Loudness
1 dBA	No perceptible change
3 dBA	Barely perceptible change
5 dBA	Readily perceptible change
10 dBA increase	Perceived as twice as loud

C. Noise Abatement Criteria

The noise analysis will identify traffic noise impacts, which will then be considered for noise mitigation. The overall goal of mitigation is to obtain a substantial noise reduction, which may or may not result in noise levels below the NAC levels. The two relevant criteria to consider when identifying and evaluating noise abatement measures to be incorporated in a project are feasibility and reasonableness. Noise mitigation will be provided if it is determined to be both feasible and reasonable.

Feasibility deals primarily with constructability and engineering considerations (e.g., Can a substantial noise reduction be achieved given the conditions of a specific location? Is the ability to achieve noise reduction limited by factors such as topography, access requirements for driveways or ramps, the presence of local cross streets, or other noise sources in the area?) A proposed noise barrier that will not achieve a minimum of 5 decibels of attenuation (positive noise reduction) for a simple majority of front-row (adjacent) receivers, under future conditions with the proposed project at the specific locale, is not considered feasible. In addition, preliminary and final design consideration should be given to the elements of safety and maintenance, and should be consistent with general AASHTO design principles.

Reasonableness is a more subjective criterion than feasibility. It implies that common sense and good judgment were applied in arriving at a decision. (e.g., Does the proposed noise abatement measure satisfy the cost criterion established under this policy?)

Some of the factors considered when determining feasibility and reasonableness of noise abatement include, but are not limited to, the following:

1. **Noise Abatement Benefits** - Every reasonable effort should be made to obtain substantial noise reductions. UDOT defines a substantial reduction when noise levels are reduced at the front row receivers by at least 10 dBA. **In any case, no barrier shall be deemed feasible if an absolute minimum reduction of 5dBA cannot be achieved for the majority of the front-row (adjacent) receivers.** It is not considered to be a prudent investment of public funds to construct a noise barrier that will not result in at least a readily perceptible noise reduction.

   In determining and abating traffic noise impacts, primary consideration will be exterior areas surrounding residential areas or areas of frequent human use that are adjacent to individual

properties. For residential areas, the consideration point will be the outside area that is immediately facing the transportation facility, which in most cases will either be the front or back yard. This also applies to special-use and non-residential areas, such as a park playground area or an outdoor restaurant seating area.

Consideration will be given only for interior areas where outside human activity is minimal, such as hospitals and churches.

2. **Land Use and Zoning** - The current zoning of the land adjacent to the transportation facility project will be reviewed during the mitigation consideration process. Noise barriers are usually not consistent with commercial or industrial zoning (Land use Category C) as businesses usually rely on visual exposure from the roadway to attract customers. However, the noise analyses and consideration of abatement will apply to all activities in Land Use Categories A, B and C.

3. **Engineering, Safety and Maintenance** - As is the case with any structure, there are engineering, safety and maintenance issues that must be considered to determine its construct ability. If any of these issues are substantial enough to preclude good safety and maintenance practices, then the barrier may be deemed not feasible. An example of this condition would be the reduction of sight distance below minimum safety standards as a result of the construction of the sound barrier.

4. **Cost of Abatement** - Residential Areas (Category B, Table 1): For residential areas, all benefited receivers must be considered in determining a noise barrier's cost per receiver regardless of whether or not they were identified as impacted. A benefited receiver is any impacted or non-impacted receiver that gets a noise reduction of 5 dBA or more as a result of the noise barrier. The maximum cost used to determine reasonableness to provide noise abatement will be $25,000 per benefited receiver. This cost is based on 2004 average cost index of noise barrier installed on UDOT projects that may be reviewed by the Department for reasonableness and updating, as needed.

   In the event that the noise barrier cost is greater than $25,000 per receiver, the cost will be considered to be reasonable only if it can be demonstrated that a "severe" noise impact will occur. Severe traffic noise impacts are defined as traffic noise impacts which are projected to increase existing receiver noise levels by 30 dBA or more, or results in absolute exterior noise levels of 80 dBA or

greater. Based on severity, abatement will be considered on a case-by-case basis.

Non-Residential Areas (Category A, B or C, Table 1): The cost of noise abatement measures for schools, parks, churches and other non-residential developments including commercial and industrial areas will depend on height of noise wall required and corresponding length of frontage this type of development has exposed to the transportation facility. In any case, a reasonable cost for mitigation for noise abatement will not exceed $200 per linear foot of wall (for a 10-foot high wall) installed. This cost is based on 2004 average cost index of noise barrier installed on UDOT projects that may be reviewed by the Department for reasonableness and updating, as needed.

5. **Public Involvement/Balloting** - The UDOT Region Project Manager (PM), the Region Public Involvement Coordinator (PIC) and the Region Environmental Engineer/Manager will decide on the appropriate level of public involvement activities. The purpose of the public involvement will be to make sure that the concerns of the affected communities are known to the Department and that every effort to provide noise abatement to an impacted community is taken. Actions to involve the public may include:

    - Special open houses
    - Mailers
    - Workshops

    UDOT will contact the local municipality and impacted residents/landowners to initiate the public involvement process. A public informational meeting may be held as part of this process.

    In determining the desire for noise abatement from the affected residents/communities, a reasonable effort will be made to send ballots to the correct address of the current owner of record that is impacted by noise as defined in this policy. In this case, a reasonable effort to obtain the current property owner of record including his/her current mailing address will consist of obtaining ownership records from the appropriate county Recorder's Office. Those that are eligible to ballot will be contacted with an explanation of the process. Prior to balloting, a reasonable effort will be made by telephone, mailer, or in person to explain the process and to determine any special needs of the residents in casting a ballot. One ballot will be sent by regular mail to each resident/land owner of record and each will be given a deadline as to when the ballots need to be returned for counting. If all ballots

sent to the “front-row” (adjacent) receivers are not returned by the deadline, a second ballot will be sent to these residents/landowners since they will receive the greatest impact of the mitigation or lack thereof. Ballots sent by regular mail are deemed by the Department as “due diligence” in notifying the affected residents of possible noise mitigation measures in their area. Only in unusual circumstances will ballots be sent by registered mail and/or door-to-door soliciting of ballots be done. The Project Manager, the Region PIC and the Region Environmental Engineer/Manager with consultation of the UDOT Environmental Director will make this determination. Ballots not returned by the deadline(s) will be considered “non-responsive and indifferent” and will be documented as such.

Noise abatement will only be considered if the combination of 75% of the “impacted front row (adjacent) receivers” and 67% overall (including front row receivers) of the “impacted residents/land owners” who receive a minimum of 5 dBA reduction, vote, through balloting, in favor of the abatement. The denominator used to calculate these percentages will be determined by the total number of ballots sent out (this number should reflect the total number of impacted receivers in each category) and not the total number of ballots returned. The balloting will be conducted **prior to** the final environmental document approval. Non-responsive ballots will be counted just as that, non-responsive, with a note that they were neither for nor against the mitigation efforts.

If the project is phased for funding and construction over several years and specifically beyond 5 years from the initial environmental document approval, then an evaluation will be completed and documented to determine whether there have been significant changes in property ownership of the impacted receivers since the initial balloting was completed. If significant changes in ownership have taken place, re-balloting of the impacted receivers during the initial phases of design for each phase of the project will be required. Significant changes in property ownership are defined as 25% or more for the purposes of re-balloting.

The procedure to determine those in favor of the noise abatement will be as follows:

a. The total number of "impacted receivers (residents/landowners)" will be determined.

b. The total number of "front row (adjacent) receivers" will be determined.

c. The Department wants to know beforehand how many votes it needs to install noise barrier on a specific project. To determine the percentage in favor of the abatement for categories "a" and "b" above, the total number of impacted receivers will be multiplied by 0.67 and the total number of "front-row" impacted receivers will be multiplied by 0.75 prior to sending out the ballots.

d. The noise ballots will be a standard form (the standard form is posted on UDOT's web site) that includes, at a minimum, the UDOT official logo, the project name, the project sponsor, the consultant's name, project number, a brief explanation of the purpose of the balloting including the approximate height, length and alignment (location) of the barriers, boxes to indicate a preference for, against, or no preference to the abatement and will include a place for comments. The ballot will also include the deadline for votes to **be received** by the Department or consultant in order to be counted. A self addressed stamped envelope will be enclosed for return of the ballot.

e. Only the owner of record of the residence/property determined to be an impacted receiver under this policy will be allowed to cast a ballot. This is further defined as each permanent single family residence and/or mobile home owner would get one vote from the owner of the residence as long as they also owned the land the residence is on, each apartment building would get one vote from the owner of the building/property regardless of how many units were in the complex, each mobile home park land owner would get one vote if the residents are renting spaces for their mobile homes. In the case of condominium/town home developments, the owner of each condominium/town home would get one vote. In the case of a retirement home, the owner of the home would get one vote for his property as a whole regardless of how many residents he

had within his building. As for commercial and/or industrial developments, the owner of the land would get one vote for each individual parcel impacted regardless of the size or market value of the property. If front-row receivers consist of a mix of residential/commercial properties, the ballots of front-row receivers will be weighted based on the percentage of their property frontage to the total frontage along the transportation corridor being considered for a noise wall.

If the impacted residents/property owners vote to reject construction of a noise abatement device, their area will not be reconsidered for future noise abatement unless a future transportation project falls under the guidelines of a Type I Project for noise abatement. **This point should be emphasized at public meetings and highlighted in mailers.**

UDOT will consider written documentation from local governments and/or community councils of their noise wall/abatement desires and/or local building ordinances prior to making a decision on noise abatement within their area of jurisdiction. This documentation will be only one of the factors, but not the sole factor, taken into account in determining whether noise mitigation is considered for a particular area of impacted receivers. Early communication with the local government agency to discuss their building ordinances for noise mitigation is encouraged to access and mitigate any conflicts that may arise over noise abatement construction.

When the ballots for noise abatement are returned, all ballot results will be placed in the project files.

6. **Abatement Design** - A noise abatement device must be designed in accordance with the following: (1) good design practice, (2) optimal performance, and (3) current highway safety technology. Aesthetics treatment, graffiti deterrence and landscaping will be considered where appropriate in consideration of design standard specifications, cost efficiency, maintenance, and local municipality regulations. Refer to Section E.1 if these features are desired by the public and costs exceed the abatement limit of section C.4.

7. **Noise Receptor Location** - Noise receptor locations are normally restricted to exterior areas of frequent human use (interior locations are only used when there are no outside activities, such as in churches, hospitals, libraries, etc.). Typically, one of three locations is considered standard practice for locating exterior noise receptors: (1) at or near the highway right-of-way line; (2) at or

near a building in residential or commercial areas; and (3) at an area between the right-of-way line and a building where frequent human activity occurs, such as a patio, pool, or play area in the yard of a home (the selection of the area of frequent human activity is made by the noise analyst). Any of these locations are acceptable, as long as the Region Environmental Engineer/Manager and the consultant chooses the location of the receptor and applies it uniformly and consistently in all the analyses that are done on the project.

Once the construction of a noise barrier has been determined feasible then the Department will determine whether its construction is reasonable by thoroughly considering the wide range of criteria described above. The UDOT Noise Abatement Measure Recommendation Checklist (See Checklist in the Appendix) will be completed and a decision of reasonableness documented in the project file. The Department will only construct noise barriers if they have been determined reasonable. The decision to recommend or not recommend a noise barrier be installed will normally be the responsibility of the Region Environmental Engineer/Manager. Concurrence will be made by the Project Manager and the Region Pre-Construction Engineer. Final approval for projects with federal involvement will be made by FHWA.

D. Miscellaneous Noise Abatement Measures

1. If a noise impact is identified, the following abatement measures may be considered including a cost/benefit analyses to compare alternatives:

    a. Traffic Management Measures (e.g. signing for the restriction of compression brakes or the reduction of speed limits).

    b. Alteration of horizontal and vertical alignments.

    c. Construction of earthen berms.

    d. Pavement surface considerations.

    e. Noise barriers will be constructed when feasible and reasonable within UDOT right of way. UDOT will own and maintain the barrier.

    f. In accordance with 23 CFR 772.13(c)(6), noise insulation of public use or nonprofit institutional structures will be considered as a noise abatement measure when determined reasonable and feasible.

g. Instances may arise in which Department right of way is not the most prudent location for noise barriers, yet noise abatement can be feasible and reasonable if built on adjacent property (or adjacent public right of way). In these cases:

1. The Department's cost is limited to normal cost for abatement on Department right-of-way.

2. Adjacent property owners allow access and easements as necessary in order to construct and maintain the barrier.

3. Maintenance of noise walls and associated landscaping on the side facing the highway will normally be the Department's responsibility if determined to be feasible and reasonable. The opposite face shall be maintained by UDOT as well, unless maintenance responsibilities are assigned to other parties.

E. Local Municipality Cost Participation

In instances where abatement costs exceed the abatement limit, the local municipality may be offered the option to incur the additional cost of abatement. In order for the Department to participate in noise abatement when costs exceed abatement limits, an agreement between the local municipality and the Department must include the following:

a. The Department's actual cost for noise abatement will not exceed the abatement limits as specified in section C.4.

b. The participating local municipality shall pay the Department an amount equal to the estimated cost of the abatement measure and appurtenances that exceed the abatement limit. Payment of an estimated cost shall be made to the Department before construction begins. Any variance between the estimated and actual cost will be settled at the completion of the project.

c. The agreement will be signed before design begins.

d. The participating local municipality’s final cost shall be based on actual construction costs.

F. Projects Funded from Other Sources

The Department may construct and maintain noise abatement measures along state highway right-of-way in cases where citizens, adjacent property owners, developers, or local municipalities provide the cost for the noise abatement; and meeting other established criteria. The Department will design, build, and maintain the abatement measure, and the local municipality acting for and in behalf of other groups will pay the department for all preliminary engineering, construction and maintenance costs.

G. Traffic Noise Prediction

Unless agreed upon in advance by UDOT and FHWA, only the current FHWA approved traffic noise prediction model (TNM) is approved for use in any traffic noise analysis.

Definitions

1. Approach Criteria - For the purpose of this document, the approach criteria is defined as within 2 decibels (dBA) of the appropriate Federal Highway Administration (FHWA) noise abatement criteria.

2. Benefited Receiver - A benefited receiver is a noise sensitive receiver that is predicted to receive a minimum of 5 dBA of noise reduction as a result of noise abatement. Only benefited receivers will be included in determination that any particular noise abatement procedure has a reasonable cost.

3. Date of Public Knowledge - The date the final environmental document (Environmental Study, Categorical Exclusion, Finding of No Significant Impact, or Record of Decision) is approved.

4. Decibel - A descriptor of the difference between sound pressure levels. For traffic noise purposes the A-weighted scale closely approximates the range of frequencies a human ear can hear. The A-weighted decibel is abbreviated dBA.

5. Design Noise Level - The noise level calculated for the worst hourly traffic noise conditions likely to occur on a regular basis during the design year. A LOS C will be used to calculate the worst hourly traffic unless there is a compelling reason not to use this level of service.

6. Design Year - The year for which the highway is designed and traffic volumes are computed. The design year is typically ten to thirty years after the time of construction.

7. Existing Noise Levels - Noise resulting from the natural and mechanical sources and human activity considered to be usually present in the particular area.

8. Front-Row Receiver - A noise sensitive receiver (resident) that is located adjacent to or “nearest” to the transportation facility.

9. Highway -Public way for purposes of vehicular travel, including the entire area within the right-of-way.

10. Impacted Receiver - A noise sensitive receiver that is or will be subjected to highway traffic noise that equals or exceeds the noise abatement criteria or exceeds existing noise levels by 10 or more decibels (dBA).

11. Landowner - The current owner of record at the appropriate county Recorder’s Office.

12. Leq - Equivalent (average) noise level, in units of decibel (dBA).

13. Leq(h) - The hourly value of Leq.

14. Municipality - A Local City, Town, County etc. having its own incorporated government for local affairs.

15. Noise Sensitive Receiver - Any property (owner occupied, rented, or leased) where frequent exterior human use occurs and where a lowered noise level would be of benefit. In those situations where there are no exterior activities to be affected by the traffic noise, the interior of the building will be used to identify a noise sensitive receiver.

16. Planned, Designed, and Programmed - The term used in this policy when the developer of a proposed development has been issued a formal building permit by the local agency of authority.

17. Receiver - Recipients of highway generated noise on property supporting activity categories A, B or C in Table I.

18. Sensitive Land Uses - Residential dwelling units, commercial/industrial sites, or other fixed, developed sites conforming to activity category A, B or C in Table 1.

19. Severe Traffic Noise Impact - A traffic noise impact which increases residential noise levels by 30 dBA or more over existing noise levels, or results in absolute noise levels of 80 dBA or more.

20. STIP - State Wide Transportation Improvement Program. This is the annually updated list of projects advancing through design to construction.

21. TNM - FHWA Traffic Noise Model computer program (Version 2.1 or applicable revisions) used for highway traffic noise prediction and analysis.

22. Type I Project - A project in conjunction with new highway construction or existing highway construction that significantly alters the horizontal or vertical alignment or increases the number of through-traffic lanes.

23. Type II Project - A project commonly referred to as a “retrofit” project to provide noise abatement along an existing highway. This type of noise abatement project is no longer performed by UDOT.

24. UDOT Noise Abatement Criteria (NAC) - The noise decibel (dBA) value reflecting the approach criteria of 2 decibels (dBA) below the NAC values listed in 23CFR772 for each land use category.

Procedures

Noise Abate UDOT 08A2-1.1

Responsibility: Region Environmental Engineer/Manager (Consultant, if employed by UDOT to complete the Noise Analyses as part of the Environmental Document preparation)

Actions

1. Determine if this is a Type-I project. If it is not a Type-I project, so disclose in the environmental document, ending the process with this step. However, consideration for noise abatement will be given in the extremely rare instance in which the project itself is expected to create a noise impact (e.g., side slopes are flattened as part of a project to improve an intersection and the traffic noise levels increase to equal or exceed the UDOT NAC and result in at least a 3dBA increase).

2. Determine types and numbers of sensitive land use activities (receptors) that might be impacted. If none, so disclose in the environmental document, ending the process with this step.

3. Measure or calculate existing noise levels.

4. Calculate design noise levels using LOS C to calculate average worst hourly traffic unless there is a compelling reason not to use this level of service. Develop design noise contours. Compare design noise abatement criterion levels and existing noise levels. Identify impacted receptors. If no impacts, summarize findings for the environmental document, ending the process with this step.

5. Consider general abatement strategies, consistent with Department policy, for all impacted receptors and for each alternative, including No Action.

6. Prepare Preliminary Noise Analysis and direct its review.

7. Prepare environmental document, and include summary of the Preliminary Noise Analysis.

Responsibility: Project Manager

8. Direct the local municipality involvement process, providing information where noise abatement is likely and where it is not likely. Also discuss any possible right-of-way impacts with the UDOT Right-Of-Way Director. If the Preliminary Noise Analysis shows that there are no noise impacts or that all impacts are unmitigatable, the process ends with this step.

Responsibility: Project Manager and Region Public Involvement Coordinator

9. Conduct public involvement process.

Responsibility: Region Environmental Engineer/Manager

10. Prepare a detailed Noise Study Report after identification of the preferred alternative and approval of the final environmental document.

11. Submit Noise Study Report to Region Preconstruction Engineer and Central Environmental Services for approval.

Responsibility: Region Preconstruction Engineer and UDOT Environmental Director

12. Review and approve Noise Study Report.

Responsibility: Project Manager

13. Incorporate the Noise Study Report into Design Study Report, and submit to the Region Preconstruction Engineer for approval.

14. Incorporate approved abatement measures into design plans and specifications.

Appendix

UTAH DEPARTMENT OF TRANSPORTATION
NOISE ABATEMENT RECOMMENDATION CHECKLIST

Project Name:
Project No.:
Prepared By:
Receiver Name/Description:

Feasibility and Reasonableness Determination

1. Does the design noise level equal or exceed the UDOT Noise Abatement Criteria as defined in Table 1 of this Policy?

Yes_____ No_____

If yes, proceed to Question #3. If no, proceed to Question #2.

2. Does the receiver, as a result of the design noise level, substantially exceed (10 or more dBA) the existing noise levels prior to construction?

Yes_____ No_____

If yes, proceed to Question #3. If no, then noise abatement is not recommended. Proceed to decision segment of form.

3. Can effective noise barriers be constructed which provide a minimum reduction of 5 dBA for a majority of front-row receivers?

Yes_____ No_____

If yes, proceed to Question #4. If no, abatement measures are not feasible and are not recommended at this site. Proceed to decision segment of form.

4. Are there undeveloped lands along the project corridor?

Yes_____ No_____

If yes, proceed to Question #5. If no, skip Question #5 and proceed to Question #6.

5. Were the undeveloped lands “planned, designed, and programmed” for development under Land Use Categories A, B or C prior to the date the final environmental decision document was approved as defined in this policy?

Yes_____ No_____

If yes, proceed to Question #6. If no, implementation of abatement is not reasonable. Noise abatement is the responsibility of the land owner/developer. Proceed to decision segment of form.

6. Can noise barriers be constructed without creating a safety hazard to users and residents, and not interfere with operations and maintenance of the highway facility?

Yes_____ No_____

If yes, proceed to Question #7. If no, abatement measures are not recommended at this site. Proceed to decision segment of form.

7. Does the cost per benefited residence exceed $25,000 for residential areas in Land Use Category B or exceed $200 per linear foot for non-residential areas in Land Use Category A and/or B or commercial and/or industrial zoned areas in Land Use Category C?

Yes_____ No_____

If no, proceed to Question #8. If yes, does this receiver have a "severe noise impact" (the design noise levels increase the existing noise levels by 30 dBA or more and/or the noise levels are 80 dBA or greater)?

Yes_____ No_____

If yes, proceed to Question #8. If no, noise abatement measures are not considered reasonable. Proceed to decision segment of form.

Questions #8 and #9 are related to all receivers where a potential wall is being considered.

8. Does the Public Involvement balloting result in a 75 percent majority of front row impacted receivers and 67 percent majority of the overall (including front row) impacted receivers voting in "favor" of the proposed noise abatement measure?

Yes_____ No_____

If no, noise abatement measures are not considered reasonable. Proceed to decision segment of form. If yes, proceed to Question #9.

9. Are there any Environmental Impacts that need special attention as a result of the implementation of the noise abatement?

Yes_____ No_____

If yes, outline these impacts and discuss with the Environmental Engineer or Manager in the Region.

Decision

Are Abatement Measures feasible? Yes_____ No_____

Are Abatement Measures reasonable? Yes_____ No_____

APPENDIX B

Figures
Noise Receptors and Existing and Proposed Contours

65 dBA Noise Contour - Existing
65 dBA Noise Contour - Alternative A
65 dBA Noise Contour - Alternative B
65 dBA Noise Contour - Alternative C
Receiver Location

Figure 1 - 65 dBA Noise Contours for Existing and Proposed Alternatives

70 dBA Noise Contour - Existing
70 dBA Noise Contour - Alternative A
70 dBA Noise Contour - Alternative B
70 dBA Noise Contour - Alternative C
Receiver Location

Figure 2 - 70 dBA Noise Contours for Existing and Proposed Alternatives